



GCSE EXAMINERS' REPORTS

**MATHEMATICS
GCSE**

NOVEMBER 2020

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Unit	Page
Foundation Tier: Component one	1
Foundation Tier: Component two	11
Higher Tier: Component one	18
Higher Tier: Component two	25

MATHEMATICS

GCSE

November 2020

Foundation Tier: Component one

General Comments

In order to succeed in this assessment, candidates needed to interpret each question carefully and make sure that they used all given information in their solution. For example, in question 14(b)(i), many candidates did not use both of the given angles in their response and were significantly penalised. Those candidates who presented their work in a neat and logical way were generally more successful as they were less likely to make simple errors such as miscopying their own figures. In question 9(b), for example, the presentation of work was often poor.

Many candidates were able to access a reasonable proportion of the examination paper and syllabus coverage overall seemed to be fairly good. This examination did not allow the use of a calculator. A good number of candidates were able to determine the method needed to solve many of the problems set, but were unable to work accurately. This was evident in questions 6, 9 and 16, for example. These candidates could improve if their basic arithmetic skills, particularly those involving subtraction of decimals and division, were to be strengthened.

All candidates seemed to have sufficient time to answer those questions that were within their capability.

Comments on individual questions/sections

- 1 (a) This was a reasonable start to the examination for most candidates, with a large proportion giving the correct answer in part (i). A small number of candidates made a slip and 60 was the usual answer seen, if that was the case. In part (ii), most candidates opted to use traditional short division and many were successful. A few found the division challenging and 23 and 14 were sometimes offered by these candidates.
- (i)/(ii)
- (b) This part was fairly well answered. It was expected that candidates use a decimal point for the decimal separator as the formal writing of a decimal was part of what was being assessed. The most common incorrect answer was 0.3., giving two decimal points.
- (c) A good number of candidates completed the statement correctly, often with little working shown. Some candidates were able to earn a mark from conversion of one or two values to the same form in order to make a comparison. Incorrect answers were sometimes selected at random without any attempt at justification.
- (d) This was fairly well answered. Candidates who worked out $24 \div 12$ first and then multiplied by 5 had a much easier solution than those who opted to find 5×24 and then divide by 12. Candidates who attempted $5 \div 12$ as an initial step were the least successful. A few candidates were confused by the operations needed and some multiplied 12 and 24, for example.

- 2 (a) In order to answer this part, candidates needed to use the data for June to determine the key for the pictogram and many were able to do this correctly. The first diagram was a vertical line graph not a bar graph. Therefore, candidates needed to draw lines and not bars, in order to complete the graph. Many were successful, although there were a few slips in the length of the lines on occasion. In order to complete the pictogram, candidates needed to draw symbols of the correct size. Some candidates would have improved if they had taken a little more care with this as, sometimes, some 'full-sized' rectangles were too small to be credited. Whilst perfection is not expected, an approximately consistent size is.
- (b)/(c) A good number of candidates deduced the correct answers to both parts, although a few candidates made arithmetic slips when answering part (b).
- 3 (a) Candidates struggled with this test of rotational symmetry. Many completed the shape to make a rhombus with triangular attachments. Some candidates did understand the *idea* of rotational symmetry but drew diagrams with two extra 'flags' and order 2 or a line of symmetry. Few candidates treated the darker dot at the centre as a centre of rotation and few creditable attempts were seen.
- (b) This part was often well answered. A few candidates added more than the 4 squares needed. Some candidates had asymmetrical answers. In a question like this, it is important that, should a candidate wish a square they have drawn not to be included, they cross it out clearly or indicate in some way that they do not wish it to be counted. Shading squares to be 'removed' from the given shape was not accepted as the instruction to 'complete' the shape was clear.
- 4 (a) A good proportion of candidates were successful in this part. Candidates needed to take care with their counting process and provide clear evidence of the correct number of total votes for each candidate. Many did this and came to the correct conclusion. A few candidates made errors and often these earned partial credit.
- (b) Again, a good proportion of candidates were able to write $\frac{20}{50} = \frac{40}{100} = 40\%$. Some candidates found $10\% \text{ of } 50 = 5$ and used a build-up method to arrive at 40%, which was also acceptable. Common incorrect answers were 20%, 33%, 30% and 60%.
- 5 (a) This was well answered, with most simply stating 12:15. A few candidates chose 11:15 and this may be from not reading the question carefully enough and thinking Sid needed to get to Broadacre bus station rather than Whiteview shopping centre.
- (b) A reasonable proportion of candidates earned full marks here. Most were able to identify the correct start and end times of the journey. A good number of these also correctly found the duration in minutes. Candidates who made errors often worked from 08:40 to 09:09 to 09:34 and added 15 minutes. These steps often resulted in more chance of making a slip, whereas candidates who, for example, worked from 08:40 to 09:00 to 09:34 and added 15 minutes were more successful.

- 6 Most candidates were able to identify the correct method to solve this money problem. Most were able to find $12 \times 50 = 600$ for LunarSat, although occasional slips were seen. Many candidates used the most efficient approach of $10 \times 55 = 550$, $550 + 35 = 585$ for A1 Cable. Those attempting 12×55 as a first step were more likely to make an arithmetic slip. A few candidates either forgot to take off the two free months or forgot to add on the setup cost. Most candidates came to a correct conclusion based on their values.
- 7 (a) Candidates typically find simplifying algebraic expressions to be a challenge and this was no exception to that rule.
- In part (i), few candidates earned 2 marks but a good number earned 1 mark, usually for finding $4x$ as part of an expression.
- The brackets in part (ii) were expanded correctly on occasion, although it was not uncommon to see $7x + 14 - 35$, which earned a mark, or $7x + 2$ which was not credited. Some candidates made no real progress at all and generally combined terms in invalid ways, such as $x + 2 = 2x$.
- A few candidates earned both marks in part (iii), although $10x$ was a common incorrect answer.
- (b) Responses to this part were very varied, with few candidates earning both marks. Many candidates were including units in part (i) and, whilst this would normally not be expected when an algebraic expression is required, on this occasion it was condoned. A few candidates gave their answers as formulae rather than expressions and, where possible, this was also condoned on this occasion. However, candidates should be aware of the difference between an expression and a formula as writing one form when another has been requested may not always be credited.
- 8 (a) Both parts of this question were fairly well answered.
- (b) Good candidates found at least 3 of the 4 points correctly. Commonly, the incorrect point was $(-1, -3)$, which was given as $(-1, -5)$. These candidates usually plotted their points accurately and some good work was seen. Other candidates struggled with $(0.5, 3)$ and/or $(1, 5)$ although they usually found $(2, 9)$ correctly. A few candidates, on plotting their points, realised that they had made a slip with one of the points and either ignored it or 'moved' it in order to draw the correct line. This was sensible. However, unfortunately, these candidates usually did not return to part (i) and make the correction to the incorrect pair of coordinates as well.
- 9 (a) This question was accessible to many candidates. A few found the arithmetic challenging but many were able to find the correct answer. A small number of candidates found the amount saved per strip and these may have improved if they had reread the question once they believed they had completed their answer. Other candidates would have improved if they had shown their method clearly as, mental arithmetic leading to an incorrect answer, cannot be credited if no working is seen. A few candidates used a very sensible approach and worked out 5×2 rather than 5×1.99 . However, on several occasions these candidates forgot to reduce the £10 they found by the extra 5p this added, or they subtracted an incorrect number of pennies.

- (b) As Sue had estimated the amount of her bill to be £170, it was expected that candidates would work with the approximate values £3 and £7 here. Those that did were in the minority, but produced neat and efficient solutions, which were almost always fully correct. Candidates who chose to use one or two exact values had a more difficult solution. Often, as part of their method, they needed to compare their total bill with £170 or correctly compare the amount for the seeds with the difference between £170 and the amount for the bags of compost. These full methods relied upon candidates finding correct values. Candidates found the subtraction of £139.80 from £170 problematic and this often resulted in incorrect work. Many candidates were able to earn a mark for a partially correct method, often for a build-up approach adding multiples of £2.89 to their £139.80. Presentation of work was often poor in this question and thus it was sometimes difficult to follow a candidate's method or intent.
- 10 (a) This was reasonably well answered. The simplest explanation was to demonstrate that the probabilities in the table summed to 1. Commenting that this resulted in 'certainty' was desirable but not required for the mark to be given. Comments such as 'I have been told this in the question.' or 'These are the only ones in the table.' were not accepted as they had made the assumption that these were the only photos available, without justification.
- (b) A fair number of candidates summed the correct values from the table. A few candidates stated both values without summing them. Other candidates gave one of the values only.
- 11 (a) A good number of candidates understood that as $24 \div 3$ was 8 then x had to be 24. Generally, this was found using arithmetic skills rather than reversing operations.
- (b) A reasonable number of candidates earned full marks in this part. Again, using arithmetic skills and embedding the answer, $5 \times 3 - 8 = 7$, was more common than reversing operations. Some candidates who did try to reverse the operations usually found $5x = 15$ but sometimes found the second step more challenging.
- 12 (a) This part was well answered.
- (b) Candidates found this part of the question much more challenging. Useful approaches were either building up the ratio 19 : 3 to 152 : 24 or connecting the ratios in the two parts and evaluating 19×8 or $9 \times 8 + 80$. Only very good candidates made any real progress with this solution. Some found 152 correctly and then went on to, for example, add a value to it or subtract a value from it, spoiling their answer.
- (c) Candidates performed better in this part. Many identified a correct method and attempted a calculation such as 82×7 , with most finding £574 correctly. A few candidates misinterpreted what was required and went on to add £820 to £574, thereby spoiling their answer. The question required candidates to find by how much the quote had increased, not to find the new amount of the quote and so this was not ignored.

- 13 (a) It was expected that candidates would draw an appropriate bar graph here, similar to that given in part (b), although a frequency polygon or curve was accepted. Many candidates produced accurate bar graphs. A few mis-located their bars and drew the first bar from 25 to 35 and so on, this was not accepted. Other candidates left gaps between each bar. This was not condoned as it was not appropriate for continuous, grouped data. Those who were attempting to draw frequency polygons or curves sometimes did not join their plots and this was not accepted. A few candidates who chose frequency polygons or curves plotted points using the lower class bound or the upper class bound rather than using the mid-points, as was required.
- (b) Fully correct solutions were not common, although were seen on occasion. A few candidates earned a mark for a correct sum of the frequencies or for 240 or, less commonly, for 60 seen as the numerator in a fraction less than one. A common incorrect answer was 75% , without working, possibly from the frequency of the modal class.
- (c) Many sensible, creditable comments were offered. Candidates simply needed to observe that the percentage of plastic being recycled had increased. Ideally, this would be justified with evidence, although this was not required for the mark to be awarded. A few candidates made statements that were not supported by the data such as 'The number of people recycling has increased.' or treated the pair of graphs as if the bars represented the months of the year, rather than the percentages of plastic being recycled.

- 14 (a) Candidates were being assessed on their ability to present an argument in this part of the question. For the first step, they were required to mark one or two appropriate angles on the diagram or accurately describe which angles they were referring to, using conventional mathematical labelling for angles, in the working space. A good number were able to mark an appropriate angle or pair of angles on the diagram, but few candidates gave correct descriptions. Some candidates would do better should they take advantage of the diagrams offered to them in such questions, therefore. For the second step, candidates needed to use the angle or pair of angles and justify the lines not being parallel. This was dependent on a successful first step. The justification needed to use correct mathematical reasoning for this topic and so, for example, 'Alternate angles are not equal' was accepted whereas 'Z angles are not equal' was not. It was very rare for a candidate to earn this second mark.
- (b)(i) A few good solutions were seen to this part of the question, although often candidates did not attempt to state reasons for any part of their solution. Most candidates who were successful found angle QPR using angles on a straight line and then found angle QRP using angles in a triangle. A few candidates made incorrect assumptions. Either they assumed that the angle allied to 146° was vertically opposite x or they assumed that triangle PQR was isosceles, without justification. Some candidates only used one of the given angles in their response. These candidates may have done better if they had realised that, in questions such as this, it would be extremely unusual for an angle that was not needed as part of the solution to be given.
- (b)(ii) Success in this part of the question depended largely on what candidates had produced in part (i). Very few candidates were able to recognise PQR as being isosceles and those that did had often assumed this in part (i) and could not be credited here. Some candidates chose isosceles but did not make a correct justification using angles. Many candidates incorrectly gave equilateral as their answer.
- 15 (a) This question was not well answered. Many candidates were unable either to select the correct point from the scatter diagram or to correctly read off the two values needed. A few candidates gave explanatory answers, stating no value.
- (b)(i) It was expected that candidates would determine that Joe's method was better as the size of the sample used would be greater. Few candidates engaged with this and many made comments such as 'Joe would be more accurate' without saying why, which was not accepted. Some candidates thought that Meera's method was better as hers still used 1 m^2 of land.
- (b)(ii) Again, few candidates made any real progress with this part of the question. It was expected that the reasoning ' 2 m^2 has 130 plants so 40 m^2 has 20×130 plants' would be used here, but there was little evidence of this way of thinking. A few candidates gained a special case mark for the average number of plants per m^2 using Joe's method.

- 16 This was a multi-step, problem-solving question. A reasonable number of candidates applied a correct method and a few of these earned full marks. Some candidates made arithmetic errors, commonly $110 \times 100 \times 80 = 88\,000$. These candidates often earned the method marks, but earned no accuracy marks, as the division of their volume by 1000 and then by 20 was commonly also incorrect. A few candidates made no progress beyond attempting to find the volume of the tank. Some candidates added the three dimensions or only multiplied two of the dimensions and were heavily penalised for these basic errors. Many candidates made no attempt to answer.
- 17 Candidates found this problem-solving question using fractions to be challenging. Very few candidates found the correct fraction. Some candidates earned a mark for writing $\frac{5}{7}$ as $\frac{15}{21}$ but most made no further progress.
Commonly candidates added $\frac{15}{21}$ and $\frac{2}{21}$.
- 18 (a)/(b) Good responses identified the compression of the vertical axis because of the scale break as being the problem with the graph in part (a) or, for part (b), were able to indicate that there appeared to be a peak when there was not or, more commonly, that the difference between the two sets of data was greatly exaggerated. It was rare for both marks to be awarded. Other responses were based on features of the graph that were not relevant, such as a dashed line for one set of data and a solid line for the other, or the use of crosses for one and dots for the other or the vertical lines being missing at each hour. Common incorrect answers to part (b) were that these features would make the graph difficult to read or the scale would be read incorrectly. Other unacceptable comments related to the collection of the data and not the drawing of the graph, as was required. Some candidates made no attempt to answer.
- 19 (a) This was well attempted with a reasonably good number of candidates offering the correct fraction.
(b) A reasonable number of correct responses were seen, although some candidates attempted to divide by 12 before multiplying by 2, but were inaccurate. These candidates may have done better if they had simplified $\frac{2}{12}$ to $\frac{1}{6}$ as the division by 6 was far easier, but not many made that connection. Many candidates divided by 2 or misinterpreted the 300 ml as the amount of one of the ingredients.
- 20 (a) Very few correct answers were seen for this part. The most common incorrect answers were 2π , 9π and $2\pi^2$. Some candidates wrote $18 \div 9 = 2$ but then spoiled their answer by stating 2π .

- (b) A reasonable number of candidates applied the correct method to solve this problem. Some of these candidates earned full marks. A few candidates gave the answer 9π or were unable to earn the final mark as they had substituted a decimal value for π . Occasionally, candidates stated the areas of the circles correctly then found $36 - 25 = 11$ and stated the answer 11. These candidates would have done better if they had stated the full method $36\pi - 25\pi$ before they wrote $36 - 25$. Some candidates were credited for the area of one circle. A few candidates incorrectly assumed the shaded area to be a circle with radius $(6 - 5)$ or used an incorrect formula for the area of a circle. Some candidates made no attempt to answer.
- 21 Some candidates were able to deduce that they needed to divide the total force by the total area and many of these earned full marks. A few candidates made arithmetic slips such as $34 + 20 = 64$ or $3 \times 2 = 5$ or $6 \times 3 = 24$. Many other candidates neglected to multiply the area of one foot by 3, finding only $54 \div 6 = 9$ or dealt with the 3 feet incorrectly by finding $54 \div 6 = 9$ then $9 \times 3 = 27$.
- 22 A small proportion of candidates earned full marks for this problem-solving question.
- Candidates could use one of two approaches with the first approach being more popular. In the first method, they found the number of bags first by finding the highest common factor of the three values given, then used that to find the number of each item. This could be done in various ways. Commonly candidates used trials of values, although a few did attempt the prime factorisation of the three given values. Those who stated $28 \times 5 = 140$, $28 \times 2 = 56$, $28 \times 10 = 280$ usually gave a fully correct solution. A few candidates found the common factor 7 or 14 as the number of bags. These earned partial credit for stating the correct numbers of each item appropriate for these factors. Some candidates stated calculations only and made no attempt to interpret these. Embedded values were not accepted and candidates needed to make it very clear what their values represented in order to be credited.
- Using the second method, candidates found the number of each item first and then used this to find the number of bags. This was generally done by simplifying ratios and a few candidates were successful using this approach which, when done well, gave a quick and neat solution to the problem.
- Some candidates determined there would be 56 bags, this most likely being from the number of pencils. These candidates usually did not give clear evidence of their strategy and often gained no marks. Other candidates simply summed 140, 56 and 280 and divided their answer by 3.
- 23 Very few candidates answered this question correctly. Common incorrect responses featured $+ 4x$ or the doubling and/or halving of the terms in the expression $12 - 4x$ or they maintained the 12 and changed the coefficient of the x . Many candidates made no attempt to answer.
- 24 A small number of candidates extracted the correct common factor and earned the mark. A few candidates offered $3x(x - 4y)$; many candidates made no attempt to answer.

- 25 (a) A small number of candidates were successful here. A few wrote the correct answer and then spoiled it by writing something such as $\sqrt{55}$.
- (b) A few candidates earned a mark for finding 4^3 , although 2 marks were rarely awarded. Common incorrect answers were 16^3 or 4^{-17} . A few candidates attempted to evaluate 4^{10} which was not a sensible approach. Many candidates made no attempt to answer.
- 26 (a) Many candidates determined that if either x or y were to be zero then the answer would have to be zero and not 1.
- There were very few successful attempts to draw the graph and many candidates made no attempt to answer this part. Some graphs were linear and others were only one branch. Some candidates would have improved if they had connected the information in part (i) with this part, as it was important that the branches of the curve did not touch or cut the axes.
- A few candidates offered an acceptable form of completion in part (iii). A common wrong answer was 'directly'. This sometimes followed a straight line drawn in the previous part of the question. This was not accepted as candidates could make the deduction 'inversely' from the equation of the graph, as some did.
- (b) A reasonable number of correct solutions were seen. Some candidates found evaluating 0.1^2 to be too much of a challenge and $0.1^2 = 0.2$ or 0.1 were commonly seen. A few candidates did not show full method and could not be credited for their incorrect values.
- 27 Candidates were expected to form and solve a pair of simultaneous equations. A few candidates did so and presented excellent and efficient solutions. Other candidates formed equations but, rather than apply an algebraic method to solve them, they used numerical methods, such as trial and improvement or inspection. This was condoned but only if it was demonstrated that the values they had found in this way satisfied all the information given. A significant loss of marks occurred if this was not done. A few other candidates formed no equations and simply attempted numerical methods of solution. Full marks were not available to these candidates and, again, if they did not demonstrate that the values they had found satisfied all the data, they were heavily penalised. Many candidates found the skills needed to answer this question were beyond them and made no attempt to answer.

Summary of key points

- Use of correct geometrical reasons and labelling could generally be improved.
- Generally, candidates had a reasonable understanding of the methods that needed to be used to solve problems. However, their arithmetic skills were not always good enough for accurate answers to be given.
- Mental arithmetic leading to an incorrect answer, cannot be credited if no working is seen.
- Addition, subtraction and multiplication skills were reasonably sound when working with integers. However, improvements might still be made with division, arithmetic with decimals and with fractions.
- When an algebraic method is required, a significant loss of marks may occur for the use of numerical methods such as trial and improvement.

MATHEMATICS

GCSE

November 2020

Foundation Tier: Component two

General Comments

To do well in this examination, candidates needed to interpret each question carefully and make sure they used all the given information, particularly key words and phrases, in their solution. They should have shown all their methods. Those candidates who presented their work in a neat and logical way were generally more successful.

Many candidates were able to access a good proportion of the questions. However, many candidates did struggle to attempt some of the later questions that are common with the higher tier paper.

Candidates were able to use a calculator for this paper but often chose to use a non-calculator method. For example, on question 11(a) many candidates attempted to find 12.5% of 6500 but finding 10%, two lots of 1% and 0.5%. When this approach was used, there were often numerical errors.

A large proportion of candidates chose to use trial and improvement on questions where a direct method to find the answer could have been used. For example, in question 2(b), candidates would substitute in values for the number of whole days hired until they found a cost that was just below £80. Candidates that adopted this approach on question 2(b) were generally successful. However, when the same approach was taken with question 14(a) very few candidates were able to arrive at the correct answer.

All candidates seemed to have sufficient time to answer those questions that were within their capability.

Comments on individual questions/sections

- Q.1 Candidates got off to a good start with this question, with many gaining some of the marks. Candidates did not always know the key terms; multiples, primes, square root and cube number and so didn't gain full marks.
- Q.2 (a) A good number of candidates were successful in this question and knew that $6B$ meant $6 \times B$.
Two common errors were, when a candidate replaced the B with 34, without multiplying, and got an answer of $634 \div 8 = 79.25$. Or they added the six and B together to get $(6 + 34) \div 8 = 5$.
Some candidates left their answer as $51/2$ so did not gain the final mark.
- (b) A good proportion of candidates used trials in this question to arrive at the correct answer of 11 days. However, many did not know the correct order of operations, multiplication before addition, and arrived at an incorrect answer of 4 days (from $14 + 5.75 = 19.75$ then $19.75 \times 4 = 79$).

- Q.3 (a) Candidates engaged well with this question and it was well answered. A good proportion of candidates arrived at the correct cost for four people whilst some mis-read the question and only worked out the cost for three people.
Candidates should work with consistent units, either all in pence or all in pounds. Some candidates arrived at an incorrect answer because of mixing units.
- (b) Candidates were expected to compare a meal deal with the purchase of separate items. Those who worked with correct units did well at this question, although some cannot write the answers to money questions correctly. The answer of 72p may have been written in pounds (£0.72) and we would have allowed £0.72p but not 0.72p, which was a common incorrect answer.
- Q.4 (a) (i) and (ii) were well answered. (iii) was answered correctly by a large proportion of candidates, but a common incorrect response, was pattern 99.
- (b) This was the first 'explain' question in the paper. It was not well answered. The expected answer (number of triangles = 2 x number of squares) was rarely seen. Too many candidates tried to over-explain or were tempted to work out an answer for a particular pattern. A common answer was 'for each square there are two triangles' which was not a statement in the form 'number of triangles = '.
- Q.5 (a) This was well answered. A small number of candidates incorrectly used 360° as the sum of the angles on a straight line.
- (b) This was well answered. Similarly, to part (a), some candidates used 360° as the sum of the interior angles of a triangle.
- Q.6 (a) Most candidates gained marks on this question. Not all candidates plotted the correct two points to create a rectangle with an area of 20 cm^2 but most were able to plot two points that created a rectangle.
- (b) Some candidates were able to plot the correct position of point E.
(i)(ii) However, some mis-interpreted the question and plotted the mid-point of AB.
Most candidates were able to give the correct coordinates of the point E they had plotted, occasionally candidates made the common error of reversing the coordinates.
- Q.7 (a) Candidates engaged well with this question, with most choosing a repeated subtraction method. A good proportion of candidates arrived at the correct answer. Some made numerical errors in their subtractions, so did not get the correct answer of 5 p.m. (or 17:00).
Not all candidates specified that it was 5 p.m. and wrote 5 o'clock or 5:00 and so were not awarded the final mark. This should be noted for future series.
- (b) This was often correct.

- Q.8 (a)(b) Many candidates used the correct probability notation, giving the answers in fractional form. Some candidates need to be aware that fractions, decimals and percentages give acceptable answers, but not ratios or probabilities written in words.

A common incorrect answer on part (a) was 20/500, where the candidate has used the number on the chosen card as the numerator.

- (c) This was one of the more successfully answered 'explain' questions. Some candidates were able to refer to the correct probability of 8/500, but the majority of candidates stated that for a 50% chance 250 tickets would need to be bought.

- (d) Part (i) was not well answered, though many did get 0.99 or 99%, many incorrect notations were used including 99.99 and 0.99%.
- (i)(ii) In part (ii) very few candidates knew that the expected number was the probability $\times$ the number of trials.
A common incorrect response was 1 ticket from 0.01×100 .

- Q.9 Candidates found this question difficult. Many candidates attempted to find the total cost for 1.8m of flowered fabric and/or 3.2m of plain fabric. Those that used an efficient method to do this, for example, $1.8 \times £12.50$ were often successful. Some chose to use a partitioning method, for example, they stated the cost for one metre as £12.50 and attempted to calculate the cost of 0.8m (or the cost for 3 metres and cost for 0.4m). This often led to numerical errors which meant their answers did not add up to £58.50.

- Q.10 (a) There were a pleasing number of correct responses, albeit with repeated combinations. An organised approach to listing combinations was generally more successful and avoided missing out (or repeating) combinations.
- (b) For a candidate to be successful in this question they needed to read the information carefully and use all the key information. There were a variety of different methods used and answers given, with the correct ones rarely seen. The mark scheme allowed for multiple methods and all of these were seen in candidates' work.

A detail that was commonly missed by candidates was that each cone needed two scoops of ice cream. Candidates then calculated the cost for enough tubs to provide 1300 scoops instead of 2600. This led to a final answer of £478.50, which was seen a significant number of times more than the correct answer of £913.50.

A continuing theme throughout this paper is that candidates often use trials to find the correct answer instead of an efficient method. This was the case in this question. Some candidates would complete trials of $125 \times n$ to find the correct number of tubs to provide either 1300 or 2600 scoops. A good number of candidates that used this method were successful in arriving at the answers of £478.50 or £913.50. Those that chose to list multiples of 125 often made numerical errors leading them to the incorrect number of tubs.

Where a candidate chose to divide the number of scoops needed by 125, to get an answer of 20.8 (or 10.4 if they did not double the number of scoops needed) they sometimes did not round up to 21 tubs (or 11 tubs) before finding the cost.

- Q.11 (a) The most common answer for this question was £812.50, where the candidate had calculated 12.5% of 6500 but did not subtract it from 6500. A small number of candidates chose to use a calculator method to find 12.5% with most using a partitioning method. For example, finding 10%, 1%, 1% and 0.5%. Where this method was used there were sometimes numerical errors leading to an incorrect answer.
- (b) Most candidates used a method for simple interest with a few attempting to calculate compound interest. An answer of £52.50 was commonly seen, where the candidate had not multiplied by 3 (years).
- (c) The correct answer of 200% was rarely seen. The majority of candidates gave an incorrect answer of 300%, as they did not realise that only the percentage *increase* was needed.
- Q.12 (a) In (i) many were able to find the median and range of the given data but were unable to select the correct reason for the explanation in (ii). When comparing data, candidates should be encouraged to use the correct statistical language (Samira because her *range* was lower).
- (i)(ii) Most candidates had success with part (i), completing an annual mileage calculation, 3405×12 . Candidates found part (ii) challenging. They needed to think of an assumption (the simplest being that 'she does the same mileage every month') and the affect caused by that assumption not being true (such as 'if this is not true, her mileage could be lower for the year'). Often candidates just repeated what they were told in the question.
- Q.13 (a) Some candidates showed understanding of volume by counting the cubes to give an answer of 20. Very few candidates knew how to calculate the volume of a cuboid and so three correct dimensions were rarely seen. An answer of $4 \times 5 = 20$ was commonly seen where the candidate was calculating an area instead of a volume.
- (b) This question proved challenging for most candidates. They were expected to explain what was incorrect about the method for finding the length of one of the sides of a cube, given its total surface area. Many candidates were looking for problems with the notation, for example, 'they forgot the ² on the 144' or 'she shouldn't have divided by 6'. Some candidates almost gained the mark when they stated $144 \div 6$ but they did not explain what was incorrect about the method that was shown.
- Q.14 (a) A pleasing number of candidates got the correct answer of 18.75 miles per second, although some went on to do further incorrect work. Several candidates used trials of $1.6 \times n$ in an attempt to get an answer of 30. Common incorrect answers were 18 or 19 miles per second from $1.6 \times 18 = 28.8$ or $1.6 \times 19 = 30.4$

- (b) In part (i) very few candidates correctly found the area 2.56 km^2 . Common incorrect responses included 1 (calculating the area in square miles) and 6.4 (calculating the perimeter in km).
 (i)(ii) Candidates were able to gain marks in part (ii) if they correctly multiplied their answer in (i) by 200 million. But most did not connect the two parts of the question and were not able to benefit from this.
- Q.15 A good proportion of candidates engaged with this question but very few gained all five marks.
 Generally, marks were awarded for measuring the line, in cm, between the two places (within the tolerance given) and for multiplying their length by 50 using the given scale.
 Some candidates then went on to calculate speed by dividing their distance by the time difference. Many candidates correctly calculated the time difference as 5 hours and 45 minutes. Unfortunately, in most cases, candidates were not able to write this time correctly as a decimal. The distance was often divided by 5.45 instead of 5.75.
- Q.16 (a) Most candidates calculated 32% of men that completed the survey in this question, instead of calculating the percentage of women who completed the survey for comparison. Most often, one mark was awarded for an answer of 48 men.
- (b) Candidates were more successful in this part of the question. The correct answer was given in many cases.
 Many candidates were able to calculate $40\% \text{ of } 225 = 90$ and got one mark. The most common response was calculating $40\% \text{ of } 225 (= 90)$ and then calculating $20\% \text{ of } 225 (= 45)$ instead of $20\% \text{ of } 90$.
- Q.17 Candidates found the comparison of all three bottles a challenge, most were only able to make a comparison between two bottles.
 Very few candidates calculated millilitres per pence or millilitres per pound for all three bottles. But those that did, tended to be successful in getting three marks.
- A common incorrect method was looking at the cost difference between each bottle. For example, 'the largest bottle is only 50p more than the medium one, but you get an extra 125ml'. This does not provide a comparison of price per millilitre or equivalent volumes with their associated costs.
- Some candidates chose to find equivalent volumes for each size bottle. For example, multiplying 200ml by five to get 1000ml and multiplying 500ml by two to get 1000ml. Many did not know how to deal with the 375ml and so often only a comparison of two bottles was completed.
- Q.18 (a) There were a pleasing number of correct responses for this question. Some candidates gave a final answer of £91.50 (one share) either because they thought Jody got one share of the money (from the ratio 1:3) or they forgot to multiply it by three.
- A common incorrect response was from dividing £366 by Jody's three parts.

- (b) Most candidates engaged well with this question and many correct ratios were seen, albeit not fully simplified. The most common response was 6:10.
- Q.19 (a) The most common range of numbers given in this part was -4 -3 -2 -1 0 1 2 3 4 5, candidates showed understanding of the inequality signs but did not engage with the $2n$ part of the inequality. Where candidates did engage with the $2n$ part of the inequality, occasionally an answer of -2 -1 1 2 was given (not counting 0 as a possible value).
- (b) Candidates need to learn the number line and circles notation to represent inequalities. There were some fully correct responses and some with only a correct circle at one end.
- Q.20 This question was not attempted by a significant number of candidates. Those that did, usually recognised that each triangle was isosceles. They went on to find the unique angle of the triangle to be 51.4° but stopped there. Unfortunately, not many candidates showed understanding of interior (or exterior) angles of a heptagon.
- Q.21 Many candidates worked out the number of times 1 point was scored, instead of more than 1 point and gave 32 as their answer. Candidates should be made aware that an answer of 8/40 is not awarded full marks as it is still written as a probability and not an expected number of times.
- Q.22 This question proved challenging for foundation candidates. It was often unattempted. Very few showed understanding of the formula for the volume of a cylinder.
- Q.23 (a) In (i) candidates needed to describe why *the shape of the graph* will not be useful to predict the future. A good response would refer to the fact that the pattern may not continue in the same way in future. There were many different responses to this question, candidates often used figures from the graph to justify why 10 thousand newspapers may not be sold in 2025. Those that chose this explanation were only successful if they referred to the fact that the difference (in newspapers sold) every five years was inconsistent.
- (i)(ii) In part (ii) some candidates successfully calculated the percentage decrease, but it was not seen often. Percentage decrease (or increase) is a skill that candidates are finding a challenge.
- (b) A standard dividing in a ratio question. A minority of candidate's mis-interpreted the question and estimated the ratio 16:9 as 20:10 and went on to calculate 20 shares of 52 000 000.
- Q.24 This question was a challenge for foundation candidates. Some recalled angle facts about parallelograms and attempted to find the values of x and y through trial and improvement. Some arrived at the correct answer for x using this method. Very few candidates were able to form an equation in x and/or y .

- Q.25 Candidates should be encouraged to learn how to construct a perpendicular bisector and angle bisector. Very few candidates showed knowledge of how to do this.
- There were attempts at constructing the perpendicular bisector. Some candidates drew arcs that touched at the mid-point of the line XY. These are not sufficient construction arcs. A correct pair of arcs that intersect twice is what is required.
- Attempts at constructing an angle bisector were rarely seen.
- Q.26 (a) Candidates that recognised they could use Pythagoras' theorem to find the value of x were generally successful on this question. Some chose to add the square of the two sides instead of subtracting.
- Many candidates did not use Pythagoras' theorem and attempted to use the formula for area of a triangle.
- (b) Fewer candidates showed knowledge of right-angled trigonometry than Pythagoras' theorem. A significant number of candidates assumed the triangle was isosceles and calculated angle y as 45° .

Summary of key points

- Candidates should learn efficient calculator methods for finding a percentage of an amount.
- Trial and improvement should be avoided where there is a more efficient method to find the answer. For example, calculating the speed in question 14(a).
- When an explanation is required, some interpretation or justification is expected, and a restatement of facts or figures is usually insufficient.
- Learn key methods for Pythagoras' theorem, trigonometry, calculating percentage increase and decrease, volume of 3-D shapes, best buy problems and constructions of line and angle bisectors.

MATHEMATICS

GCSE

November 2020

Higher Tier: Component one

General Comments

To succeed in this examination, candidates need to read each question carefully and make sure they use all given information in their solution. Good arithmetic skills are required across all forms of number. Presentation is important as candidates who present their work in a neat and logical way are generally more successful being less likely to make simple errors such as miscopying their own figures.

All candidates seemed to have sufficient time to answer those questions that were within their capability. The number of entries was low for this series. Points that have arisen from the candidates' solutions have been included in this report along with comments regarding the expected approach in places

Comments on individual questions/sections

- 1 (a)/(b) Good responses identified the compression of the vertical axis because of the scale break as being the problem with the graph in part (a) or, for part (b), were able to indicate that there appeared to be a peak when there was not or, more commonly, that the difference between the two sets of data was greatly exaggerated. It was rare for both marks to be awarded. Other responses were based on features of the graph that were not relevant, such as a dashed line for one set of data and a solid line for the other, or the use of crosses for one and dots for the other or the vertical lines being missing at each hour. Common incorrect answers to part (b) were that these features would make the graph difficult to read or the scale would be read incorrectly. Other unacceptable comments related to the collection of the data and not the drawing of the graph, as was required.
- 2 (a) This was very well answered with the majority of candidates offering the correct fraction.
(b) A good number of correct responses were seen. Some candidates attempted to divide by 12 before multiplying by 2, but were inaccurate. Some candidates may have done better if they had simplified $\frac{2}{12}$ to $\frac{1}{6}$ as the division by 6 was far easier, but not many made that connection. A few candidates divided by 2 or misinterpreted the 300 ml as the amount of one of the ingredients.

- 3 A few candidates were able to give a fully correct solution. Some found the correct improper fraction and then either omitted to convert to a mixed number or gave a mixed number that was not in lowest terms. A few candidates were able to earn the first mark but not able to complete the calculation correctly. Some of these candidates were credited for converting their improper fraction to a mixed number in its simplest form. Examples of errors were $\frac{22}{8} \div \frac{5}{8} = \frac{4.4}{8}$ or attempting to find $\frac{11}{4} \times \frac{5}{8}$.
- 4 (a) A reasonable number of correct answers were seen. The most common incorrect answers were 2π or $2\pi^2$. Some candidates wrote $18 \div 9 = 2$ but then spoiled their answer by stating 2π .
- (b) A good number of candidates applied the correct method to solve this problem. Many of these candidates earned full marks. A few candidates gave the answer 9π or were unable to earn the final mark as they had substituted a decimal value for π . A few candidates stated the areas of the circles correctly then found $36 - 25 = 11$ and stated the answer 11. These candidates would have done better if they had stated the full method $36\pi - 25\pi$ before they wrote $36 - 25$. Some candidates were credited for the area of either circle. A few candidates incorrectly assumed the shaded area to be a circle with radius $(6 - 5)$ or used an incorrect formula for the area of a circle.
- 5 Many candidates were able to deduce that they needed to divide the total force by the total area and many of these earned full marks. A few candidates made arithmetic slips such as $34 + 20 = 64$ or $3 \times 2 = 5$ or $6 \times 3 = 24$. Other candidates neglected to multiply the area of one foot by 3, finding only $54 \div 6 = 9$ or dealt with the 3 feet incorrectly by finding $54 \div 6 = 9$ then $9 \times 3 = 27$.
- 6 (a) (i)/(ii) Candidates needed to observe that Eric should have found $\frac{5}{8}$ of 36 and the $\frac{3}{8}$ he had actually found was the amount of the reduction in his spending rather than the new amount he would spend. They could make a variety of comments to indicate this and those who attempted to answer often said something that was acceptable.
- (b) Some excellent solutions were seen to this part of the question and a reasonable number of candidates earned full marks. Those who did not, often earned a mark for stating a ratio such as $54 : 12 : 14$. These candidates made no use of $a + b + c = 200$ and perhaps they might have improved if they had reread the question and made use of all the information given. A few candidates made no attempt to answer or attempted to add the components of the ratios rather than multiply, with $9 : 8 : 7$ being seen on occasion.

- 7 About a quarter of candidates earned full marks for this problem-solving question.
- Candidates could use one of two approaches, and these seemed equally popular. In the first method, they found the number of bags first by finding the highest common factor of the three values given, then used that to find the number of each item. This could be done in various ways. Many candidates used the prime factorisation of the three numbers, a few used trials of values. Those who stated $28 \times 5 = 140$, $28 \times 2 = 56$, $28 \times 10 = 280$ usually gave a fully correct solution. A few candidates found the common factor 7 or 14 as the number of bags. These earned partial credit for stating the correct numbers of each item appropriate for these factors. Some candidates stated calculations only and made no attempt to interpret these. Embedded values were not accepted and candidates needed to make it very clear what their values represented in order to be credited.
- Using the second method, candidates found the number of each item first and then used this to find the number of bags. This was generally done by simplifying ratios and many candidates were successful using this approach which, when done well, gave a quick and neat solution to the problem.
- A few candidates determined there would be 56 bags, this most likely being from the number of pencils. These candidates usually did not give clear evidence of their strategy and often gained no marks.
- 8 A small number of candidates answered this question correctly. Common incorrect responses featured $+4x$ or doubled or halved $12 - 4x$ or maintained the 12 and changed the coefficient of the x .
- 9 (a) Many candidates determined that if either x or y were to be zero then the answer would have to be zero and not 1.
- There were few successful attempts to draw the graph and many candidates made no attempt to answer this part. Some graphs were linear and others were only one branch. Some candidates would have improved if they had connected the information in part (i) with this part, as it was important that the branches of the curve did not touch or cut the axes.
- A few candidates offered an acceptable form of completion in part (iii). A common wrong answer was 'directly'. This often followed a straight line drawn in the previous part of the question. This was not accepted as candidates could make the deduction 'inversely' from the equation of the graph, as some did.
- (b) A good number of correct solutions were seen. Some candidates found evaluating 0.1^2 to be too much of a challenge and $0.1^2 = 0.2$ or 0.1 were commonly seen. A few candidates did not show full method and could not be credited for their incorrect values.

- 10 (a)/(b) A small number of candidates gained full credit in both parts of this standard equation solving question. In part (a), candidates sometimes made errors when expanding the brackets, either multiplying all terms by 10 or making a sign error with the final term or both. In part (b), no credit was given for solutions found by inspection as the requirement was that candidates obtain solutions from factors.
- 11 (a)/(b) Many candidates were able to state and evaluate the correct product in one or both parts. A few candidates made arithmetic errors or misread/misinterpreted the probability tree. Weaker candidates often added the probabilities rather than multiplying them. These candidates may have improved if they had considered that the answer 1.3, which arose in part (b) when they did this, was not a valid probability.
- 12 (a) This part of the question was well answered. The most common error was an answer of $-\frac{243}{32}$.
- (b) A reasonable number of fully correct answers were seen. Occasionally, slips were made in dealing with $(\sqrt{3})^3$. Many candidates made no attempt to answer or did not appreciate that n was 3.
- (c) Candidates found this part of the question challenging and few offered anything of value. Those that did were fully correct or stated $\frac{n^2}{2}$. Some candidates attempted to find the term-to-term rule rather than the position-to-term rule. Others had linear rather than quadratic rules.
- 13 (a) A small number of candidates drew a fully correct diagram. Candidates who used the given vector $\mathbf{p}$ were more successful than those who tried to redraw $\mathbf{p}$ and then add $2\mathbf{q}$ to it, as slips in drawing were seen. A few others omitted the direction arrow from an otherwise correct diagram. A small number of candidates made no attempt to draw the vector but were credited for stating $\begin{pmatrix} 3 \\ -8 \end{pmatrix}$.
- (b) Very poorly answered with most candidates making no real progress or attempting arguments based on similar triangles. This was not accepted as the question clearly indicated that a vector method was required.
- 14 (a) A few fully correct solutions were seen. Some candidates took a correct first step and then completed the solution incorrectly. A few candidates multiplied and divided the powers or made no attempt to answer.
- (b) Again, a few fully correct solutions were seen, but many candidates were unable to interpret the fractional powers correctly. Common incorrect answers were 4 and 36 from finding $\frac{1}{4}$ of 16 and $\frac{4}{3}$ of 27. Many candidates made no attempt to answer.

- (c) It was expected that candidates would find $(4 \times 10^6)^3 = 64 \times 10^{18}$ and then correct the answer to standard form. A few candidates did this very efficiently. Some candidates omitted to cube the 4. Candidates attempting to cube 4 million generally made place value errors that could have been avoided. Some candidates tried to work with exact values which resulted in a significant loss of marks.
- (d) Some excellent solutions were seen to this part. A few candidates did not notice that 6 is a factor of 42 and did not write a as an integer. Many candidates made no attempt to answer.
- 15 (a) Most candidates were able to answer part (i) correctly, although there were some misreads of the scale. Success in part (ii) was much more varied. Some candidates misread the median whilst others, after correctly finding the upper and lower quartiles, were unsure of how to find or state the interquartile range. Other candidates stated 50, 25 and 75 for the median and quartiles or had an upper quartile that was less than the lower quartile.
- (b) Responses to this part were also varied. Some candidates were unable to make use of the information about the range and had whiskers ending at the wrong points. A few candidates had no box or constructed box plots that bore no resemblance to the data.
- For part (ii), some excellent reasons were given for the choice of Firebird. Comments about the median or average were not relevant and were not credited. Some candidates spoiled a correct statement by going on to add elements that did not justify their decision or by making an incorrect choice of Marvel. This was not allowed.
- 16 Many candidates found this question challenging. Difficulties arose in dealing with '150% more' which many misunderstood as '150% of'. Also, candidates commonly found 0.1×110 or 0.1×30 rather than 0.1×240 . Many candidates were unable to find sufficient values to find the probability required. Presentation of work was often very poor.
- 17 This was very poorly answered with very few candidates earning any credit. It was evident from diagrams seen that candidates found the sequencing of transformations challenging.
- 18 (a) At this point in the paper, few candidates were making progress with the questions presented. A small number were able to earn one or two marks here, though full credit was rarely given. Commonly these candidates would make a correct argument for RHS and then state SAS, incorrectly, instead.
- (b) Candidates found this difficult to answer. The most efficient explanation, that opposite angles in a cyclic quadrilateral sum to 180 degrees was not seen. Some candidates came to the incorrect conclusion that a kite with two opposite right angles had to be a square.
- 19 This standard question on recurring decimals was not well answered. A few fully correct answers were seen. Rarely was full method shown.

- 20 (a)/(b) Candidates needed to apply the product rule for counting to find the number of arrangements here. It was evident that, while some candidates had done some work in this area, understanding of what they are trying to do is still variable. Candidates attempting to evaluate $10!$ might have improved if they had realised that this was very unlikely when they did not have access to a calculator.

A few candidates observed in part (b) that they would need 2 in every 10 arrangements from part (a) but not all of these attempted to find this value.

- 21 (a)/(b) Some excellent solutions were seen to both parts of this question. A small number of candidates were able to correctly find the inverse function in part (a) and make a correct and reasonable statement. A few candidates gave the reciprocal of the function, misinterpreting the notation. This may be avoided if they refer to $f^{-1}(x)$ as 'f inverse' and **not** 'f to the minus 1'.

In part (b), again a small number found the correct composite function and gave a fully correct solution. A few candidates found the product of functions rather than a composite function.

- 22 A few candidates applied the cosine rule correctly gave a fully correct solution. Some candidates were unable to recall $\cos(60^\circ) = \frac{1}{2}$. Many candidates treated the triangle as right-angled and tried basic trigonometry or Pythagoras, without success.

- 23 A small number of candidates made progress with this problem-solving question using the equation of a circle. Of those who did make a valid attempt, very few fully justified the congruent triangles being equilateral and, whilst some candidates earned 3 marks, it was rare to award full credit. Many candidates made no attempt to answer.

- 24 (a) Correct answers to this part were rare. Few candidates drew tangents and most used kinematics formulae appropriate for constant acceleration, which was not the case here.

- (b) It was expected that candidates should use 5 strips using triangles/trapezia/rectangles, or the equivalent in triangles and rectangles, to find an **efficient** estimate of the area under the curve. Some candidates did this and produced excellent and accurate solutions. The strips should have been formed using points on the graph and some candidates were able to do this correctly and an acceptable value. A few candidates used less efficient estimates based on strips that were not all formed using points on the graph or that were based on rectangles which gave a gross overestimate. Using the sum of 5 rectangles, with the exception of mid-ordinate type approaches, was not accepted as a method.

A few candidates identified the area they had found as a distance. Common incorrect answers were velocity and acceleration.

25 A very small number of candidates were able to complete the square correctly. A few were credited for offering $(x + 4)^2$. Many candidates made no attempt to answer part (a).

Part (b) was not dependent on part (a) and it was possible for candidates to find the correct pair of coordinates using the roots and symmetry, although this was not seen.

A few candidates were able to earn some credit, although most found this to be beyond them.

Summary of key points

- When more than one mark is available for a question, candidates should always show full method. The more marks there are, the more steps there are likely to be in the method.
- Candidates should take care to ensure they use **all** the information given in a question in their solution. Omitting to use a value or piece of information generally results in a significant loss of marks.
- Arithmetic skills were reasonably sound although some improvements could be made to squaring decimal values and working with mixed numbers.
- Interpretation of terms with indices remains variable and some improvements could be made, especially when working with fractional powers.

MATHEMATICS

GCSE

November 2020

Higher Tier: Component two

General Comments

Weaker candidates found the questions towards the end of the paper more demanding. This is as expected.

The paper differentiated well, with different styles of questions and a graduation in the level of difficulty.

As item level data is available to all centres, by centre and for individual candidates with comparison of all candidates sitting these examinations, this report will focus on common errors and misconceptions to aid the interpretation of the data available rather than focus whether each question was well answered or not.

Comments on individual questions/sections

- | | | |
|----|-----|--|
| 1 | (a) | This was well answered although too many candidates adopted techniques that would be appropriate on a non-calculator paper. |
| | (b) | Too many candidates reduced the value by 176%, ($16\% \times 11$) and accordingly decided that value of the car was negative. |
| 2* | | Of the candidates that attempted the question, the majority started with the 64.3 degrees that they were supposed to be obtaining.

In 'show that' questions, candidates must appreciate the need to show working and ideally explanation at each stage. |
| 3* | | It was noticeable that a number of candidates calculated how many times Rashid scored 1 point and did not continue from there. |
| 4* | | Very few candidates used an incorrect formula to calculate the area of a circle. |
| 5* | (a) | Many candidates correctly referred to the inconsistent trend in graph. |
| | (b) | Most candidates displayed a good understanding of the requirement here. |
| 6* | | Many candidates demonstrated a good understanding of angles within parallel lines and also of algebraic expressions. A numerical, rather than algebraic approach was used by the majority of candidates. |
| 7* | | Few candidates were able to demonstrate either the knowledge of the loci or the drawing skills required here. |

- 8* (a) Candidates do need to ensure that they show the steps in their calculations. Many used Pythagoras' Theorem but a minority used it incorrectly and obtained a value for x greater than 11.3.
- (b) There were a number of correct but longwinded methods employed.
- 9 Many candidates adopted an approach using the distance, speed, time 'triangle'. A minority of candidates still decided to divide speed by distance and others who had started correctly, failed to convert decimal hours to minutes correctly, 0.10 hours being 10 mins.
- 10 (a) Few misconceptions noted.
- (b) A variety of methods were employed to obtain the correct answer.
- 11 Some inventive methods were adopted. Candidates should be advised of the need to add explain their approaches, e.g. 200 ml has a mass of 185 g.
- 12 (a) Only a few candidates gave coordinates as their solution, this was not accepted.
- (b) Too many candidates displayed a lack of knowledge of the symmetry of the curve.
- 13 A minority of candidates used $\text{density} = \text{mass} \times \text{volume}$. Candidates should consider the units of the answer as a guide to the calculation required. A minority of candidates failed to round their answers. Poor calculator work led to $3.30 \times 10^{23} \div 6.08 \times 10^{19} = 5.4276.. \times 10^{41}$ rather too often.
- 14 Many candidates find proof questions demanding and, in this question, many gave numerical examples. There were very few algebraic solutions, but a few candidates gained marks for explanations.
- 15 Candidates usually show a good understanding of the mean of grouped data. Here, the majority failed to engage with the algebra requirement.
- 16 (a) The triangle was drawn to assist candidates, but of those that attempted the question, many were not able to progress beyond finding the value for r .
- (b) Nearly all candidates showed a lack of knowledge of the ratio of areas for similar figures and often gained at most, the one mark for the use of the linear ratio. A few candidates were, in this case, able to use other complete methods and gain full marks.
- 17 (a) Many candidates did not know how to begin and would be advised to start questions similar to this with a diagram showing the information given.
- (b) A lack of knowledge of the quadratic formula was displayed by too many candidates.
- 18 The majority of candidates were unable to produce any inequalities and accordingly failed to answer the question.

- 19 (a) The concept of a histogram, with frequency represent by area, was unfamiliar to the majority of candidates.
- (b) The most common answer was 80 patients.
- 20 (a) A minority of candidates drew tree diagrams and were able to make some progress.
- (b) Very few candidates were able to complete the Venn diagram correctly meaning that most candidates but were then unable to progress beyond (i).
- 21 The majority of candidates appear to have no understanding of bounds.
- 22 (a) Those candidates that engaged with the question were generally able to complete this part.
- (b) The majority of the candidates were unable to start this part. Those that did needed to take more care with the accuracy of their answers.
- 23 (a) Too many candidates have no knowledge of the rules for non-right-angled triangle.
- (b) Knowledge of $\frac{1}{2}ab\sin C$ was expected here and rarely seen.
- 24 (a) Only a few candidates attempted to sketch the graph.
- (b) One mark was available for the answer of 40° . This should be accessible by all candidates that have covered the basics of trigonometry.
- 25 (a)(i) Initially was too often taken as the end of year 1.
- (a)(ii) A minority of candidates were able to calculate the total at the end of 5 years but were then unable to calculate the correct percentage increase.
- (a)(iii) The connection between months and years was missed by too many candidates.
- (b) A demanding question that few candidates engaged with.
- 26 (a) Only a few candidates demonstrated any understanding here.
- (b) It was pleasing to find a few candidates that had failed to answer (a) were able to make valid attempts here.

Summary of key points

- Candidates need to show the calculations they are performing and should annotate their solutions with simple explanations.
- Candidates that engaged with the earlier questions generally displayed a lack of understanding of basic algebra, angles in polygons, loci and construction.
- Those candidates able to engage with the majority of the questions showed little understanding of bounds or histograms.



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